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A Feature for the Coming Season

"The Tie-in of Factory Records"

THE directors of our Society, at a meeting held in April, agreed to select a subject for discussion in common among our Chapters during the coming season. Accordingly, President Thompson was authorized to obtain suggestions from the Chairman of the Chapters, and to select one of these. Five topics were suggested, and after consultation with the vice-presidents of the Society, Col. Thompson has seen unmistakably that the one regarded as most suitable is

"The Tie-in of Factory Records"

This topic is, therefore, to have a place on the program of each Chapter, so far as local circumstances permit. November is suggested as a suitable time, so that the material resulting can be collected and published in one or two special numbers of Cost and Management, as soon as possible thereafter.

The following points, submitted along the original suggestion of this topic, should be of help:

"For instance, methods of keeping accurate count of pieces processed through several departments largely on piece work rates; methods of keeping accurate records of raw materials drawn, and returns of unused or overdrawn materials; methods of handling scrap, both raw materials and scraped parts; methods of handling repairs on parts in process or when turned back by final inspection for repair; and the tie-up of all these factors with costs, either standard or actual."

The subject selected is one which is both practical and of wide application, so that it meets the idea the directors have in mind—which is to stimulate thought and discussion throughout the membership of the Society, and to obtain such a wealth of illustration and ideas that the whole, when published, should constitute a very thorough exposition of the subject, and be of value to everyone concerned.

Other suggestions which were put forward are printed below, so that they are on record for possible use in future years:

1. Comparison of the Utility of Standard and Actual Costs.
2. Determination and Detail of Time Studies.
3. Method of Application of Burden to Time Study.
4. Distribution of Administrative and Selling Expenses.

NEW MEMBERS

The following are new members of our Society:
Killien, Lawrence L., Ruddy Koester Co., Ltd., Winnipeg.
Pleau, Pierre, General Motors of Canada, Ltd., Montreal.
Morton, R. Paul I., Hope Audit Company, Montreal.

The Municipal System of Montreal

By G. E. SAINT PIERRE, K.C.
Chief Advocate, City of Montreal

(Before Montreal Chapter, February 21, 1929.)

THERE is an old proverb which says: "Silence is golden." If I had to apply this proverb, I would not be here this evening. Having had the occasion to be present at the lectures given by your association, I congratulated the actual president, Mr. Leroux, about their efficacy, and the benefit and knowledge all members must obtain from these lectures.

The conversation had not been forgotten, and when Mr. Leroux was elected president of the association, he remembered my eulogical remarks regarding your system and took the occasion to ask me to act accordingly telling the citizens all they should know about their municipal system.

The City of Montreal, as old as Canada, obtained its incorporated act only in 1832. It is useless for me to mention, that after being administered by Judges of the Peace, counsellors and aldermen and as a mayor elected by aldermen, by aldermen alone, and after the aldermen, by a controllers' office, whose president was the Mayor, then by the Administrative Commission, the City is presently administered by the Executive Committee and by a Council presided over by the Mayor.

The Council consists of the Mayor and of 35 aldermen.

The Mayor is elected by all the wards, but has only representative powers; he presides over all meetings of the Council, and has a casting vote, in the case of an equality of votes, but he does not vote otherwise, except when a majority of all members is required, when he may vote as member, but shall have no casting vote. The Mayor calls meetings of the council and signs the deeds presented to him.

In the event of the mayor refusing to call a special meeting, five members of the council, or the Executive Committee may call one. If he, the mayor, refuses to sign the documents during a period of 48 hours after they have been presented to him, the President of the Executive Committee is authorized to sign in his place upon a certificate, to that effect, given by the city clerk.

The aldermen are elected in their respective wards.

After general municipal election, they choose their president and the members of the Executive Committee.

When the Executive Committee is chosen, we are in presence of a cabinet-council or chamber-assembly, or in other terms of a board of management and shareholders of a company.

Powers of Executive Committee

The powers of the Executive Committee are such as those of the administrators who shall examine the demands and may, in certain

cases, settle them without going before the Council, but in other cases, and other conditions, they must go before the Council for approbation.

The Executive Committee shall prepare and submit to the Council:

(a) The annual budget on or before the 1st of December, and the supplementary budget, on or before the 1st of June;
(b) every demand for the appropriation of the proceeds of loans and for any other credit required;
(c) all the by-laws;
(d) every demand for a transfer of funds or credits already voted;
(e) every report on the taxes, permits or licenses that may be imposed;
(f) every report recommending the granting of franchises and privileges;
(g) every report relating to the sale, the exchange of property or leasing of the same by emphyteutic lease;
(h) every other report, the object whereof has not been declared to be under the exclusive jurisdiction of the executive committee.
(i) The Executive Committee must submit to the Council every draft contract authorizing an expenditure of more than five thousand dollars.

The above powers are those of the Council.

The Council may, having before it the reports of the Executive, upon the majority vote of the members present, amend, reject or adopt a report of the Executive Committee with the exception of reports recommending the granting of contracts called for by tender, which can only be adopted, or rejected.

This article has been much criticized in the past, but the reason it exists is very simple. If the Council is not satisfied with the report, it may reject same, but permitting the Council to amend reports, means the putting aside of all the considerations of the Executive Committee relative to it and thereby creating a conflict between the Council and the Executive.

How the Council communicates with the various departments: Through the Executive Committee, by way of resolution.

The Executive Committee administers the City.

The Executive Committee grants all contracts, entailing an expenditure of not more than five thousand dollars, without the approval of the council.

It authorizes the payment of all the sums due by the city according to the formalities defined by the charter.

It must see that the law, the municipal by-laws and the city's contracts are faithfully observed and fulfilled.

It shall see to the preparation of plans and specifications, and to the calling for tenders.

The Executive Committee has the supervision of the heads of all departments, with the exception of the City Clerk, the Chief City Attorney, the Comptroller and the Assessors.

All heads of departments, including the assessors, are appointed, suspended or dismissed by the council on a report of the Executive

Committee. Such report cannot be amended. It can only be rejected by an absolute majority of the council.

Tenders must be called for in all cases where the expenditure to be incurred exceeds two thousand five hundred dollars.

The above powers are those of the Executive Committee.

Relation to Department Heads

How the Executive Committee must communicate with the heads of Departments through the Director of Municipal Services?

The Director of Municipal Services is appointed by the Council, without any report of the Executive, upon the entire majority of the Council. His suspension or dismissal shall be decided by the Council.

The Director of departments must devote all his time to the service of the city on working days. He may not have any other duty or employment, nor any other remunerative occupation, nor have any direct or indirect interest, in any capacity whatsoever, in any public utility company operating any service whatever in the city, nor in any contract in which the city is interested.

The Director of departments must attend all the sittings of the Executive Committee, and shall be entitled to take part in its deliberations, but not to vote.

In other words, the powers of the Director of Departments consist in placing before the Executive Committee all the reports of the various departments upon reports submitted to him by the heads of each department and to discuss same, if necessary, but not to vote, and to forward, by resolution, to the Chief of the interested departments all the instructions of the Executive Committee.

Administrative Departments

For the administration of the City, there are seven administrative departments, namely: the Law Department, the Health Department, the Public Works Department, the Fire Department, the Police Department, the Finance Department and the Department of the City Clerk.

The heads of departments, shall be directly responsible to the Executive Committee for the administration of their departments, and the latter may require their verbal or written advice on all matters connected with their departments. They shall choose, appoint and replace all their subordinate employees, with the approval of the executive committee. They shall prepare, every year, the budget of their respective departments, and make all reports required by the Executive Committee.

Law Department

The Law Department is composed of: The lawyers, the notary, the Recorder's Court.

The duties of the lawyers consist in giving all their working days to the City, and to give advice to the administration and the head of the various departments. They must plead before the different courts of our country, before the Railway Commission of Canada, before the Board of Public Utility Services, before the Board of Electric Commission. They must also plead before the Chambers of the Federal and Provincial Governments.

They must also attend to the claims that are before the Board of Compensation law. The Chief Attorney must also initial all the deeds prepared by the notary, that are to be signed by the Mayor and the City Clerk, or by the President of the Executive Committee and the City Clerk.

The Chief Attorney must also approve all the by-laws that are submitted to the Council.

The Notary prepares all the contracts concerning the City, relating to purchases, sales, cessions, donations, leases and public work contracts.

The Recorder's Court is under the jurisdiction of the law department and is represented by a lawyer who is in charge and reports to the Chief City Attorney.

Health Department

The Health Department is represented by a medical chief, who supervises the following divisions:

1. Contagious diseases division, with a superintendent.
2. Child Hygiene division, with a superintendent.
3. Sanitation division, with a superintendent.
4. Food inspection division, with a superintendent.
5. Municipal Assistance, with a superintendent.
6. Medical Control division, with a superintendent.
7. Laboratories division, with a superintendent.
8. Statistics division, with a superintendent.

You will find in a report prepared in 1927, all activities of the Health Department in its different divisions.

Public Works Department

The Public Works Service is represented by the Director of Public Works, who supervises the following divisions:

1. Technical Service.
2. Road Department.
3. Sewers Department.
4. Aqueduct Department.
5. Parks Department.
6. Light Department.
7. Municipal Shop Service.
8. Incineration Department.
9. Building Inspection Department.
10. Boilers Inspection Department.
11. Mount Royal Park division.
12. Playgrounds division.
13. Fire alarm and police telephone system.

The police service is represented by the Chief of Police, who supervises the officers and the different police stations.

The Fire service is represented by the Fire Chief, who supervises the officers and the different fire stations.

The municipal secretary's office is represented by the City Clerk, and is formed of the City Clerk's Department, the municipal archives and the municipal library.

Finance Department

The Finance service is represented by the Treasurer, who supervises the following divisions:

Privilege and License Department, with a superintendent.
Department of Purchases and Sales.
Markets' division.
Printing and Stationery Department.

This service also comprises the following departments, viz.:

1. Arrears of Taxes.
2. Special Taxes.
3. School Taxes.
4. Water and Business Taxes.
5. Properties sold by Sheriff.
6. Accountant's Department.
7. Cashier's Department.
8. Property Sales Department.

There are also in the administration two departments which are not under the jurisdiction of the Treasurer, and which are independent. One is the Comptroller and Auditor's Department. This department is under the jurisdiction of the Comptroller.

His functions are: 1, to advise the administration of the disposable funds for all enterprises; 2, to control all the expenses of the administration; 3, to audit, once in a while, the books of the different departments to verify their expenses.

The other is the department of the Assessors, which prepares the general and special rolls of taxes.

Preparation of the Budget

Perhaps it would be interesting for you to know how the budget is prepared.

The way to prepare the budget is determined by the Article 335 of the charter that reads as follows:

"335. The amount voted on the yearly estimates must never exceed the probable amount of revenues for the ensuing year. This probable revenue shall be estimated as follows:

"(a) By taking the amount of the real estate tax, of the water rates and of the business tax for the current year, taking into account the probable increase or decrease that may result from the increase or decrease in the rate of such taxes, provided that such taxes so increased or decreased be established before or at the time that the estimates are adopted;

"(b) By adding to the amount of the said rolls the probable amount to be collected during the following year from all persons, companies or corporations, either under the by-laws, contracts or other deeds;

"(c) By adding to the above sums an amount corresponding to any other revenue collected during the current year to the 31st of October inclusive, as well as the probable amount to be collected during the following months of November and December.

"In cases of urgent necessity, such as epidemics, inundations, damages caused by irresistible force, or judgments, the council

may, by by-law, make any appropriation it may think necessary beyond the amount at its disposal; provided that, by such by-law, an additional assessment shall be imposed upon immoveable property, payable during the course of the year in which such by-law is passed, sufficient to cover the amount so appropriated; such assessment shall be imposed, recovered and collected in the same manner as the ordinary assessments on immovable property, imposed and levided in virtue of the law."

The 1929 budget has been prepared in conformity with this article, and here is the result:

Real estate tax	$21,421,055.15	
Water tax	4,379,495.48	
Business tax	2,377,888.70	
Receipts to October 31st, 1927, other revenues	4,563,644.59	
Receipts during November, Dec., 1927	670,669.20	
Montreal Tramways Company, 1929	500,000.00	
		$33,812,753.12

There is also the supplementary budget, which is determined by Article 335a of the charter that reads as follows:

"335a. It shall be the duty of the City Comptroller to submit to the Council, at its monthly meeting of the month of April, each year, an estimate, of the surplus resulting from the previous fiscal years, after the appropriation votes and the obligations connected therewith shall have been provided for. This estimate shall also mention the probable collection of such surplus before the expiration of the then current fiscal year.

"The council after the first day of May, may vote as supplementary appropriations for administration purposes, permanent works or other purposes provided by the charter, the sum established according to the preceding paragraph."

The Taxes

What are the taxes that the City imposes to provide for its administration?

They are as follows:

1. Real estate taxes imposed upon immovable properties which comprise lands, buildings, machineries used to produce or distribute motive power.

Immovable properties comprise also:

"Pipes, poles, wires, rails, tunnels, conduits and other constructions and apparatus of every nature used to produce or distribute, for public use, motive power, light, heat, water, electricity or for traction purposes, constructed or placed on, over or under property, streets, highways or elsewhere within the limits of the city, or for conveying or receiving telegraph, telephone or pneumatic messages."

By by-law this tax is now fixed at $1.35 per hundred dollars of assessment.

2. The school tax, which is also imposed on the Catholics, the Protestants and the neutrals on a different basis, and which is levied by the City for the Catholic and Protestant Commissions.

3. Special taxes for special loans, for instance, the loan for the reconstruction of the City Hall.

4. The tax for the removing of snow from the sidewalks at 10 cts. per foot frontage.

5. The special paving tax to pay the difference between the price paid by the proprietors and the real cost of paving.

6. The business tax on all trades, manufactures, financial or commercial institutions, premises occupied as warehouses or storehouses, occupations, arts, professions, or means of profit or livelihood, carried on or exercised by any person or persons, in the city. The rate is fixed by a by-law at 8½% on the annual value of the properties occupied.

7. The water tax, at the rate of 6%, is based on the rental of the properties occupied.

8. The special paving taxes of streets and lanes, sewers, sidewalks, expropriations, water pipes, are levied on the proprietors who benefit by these improvements, and which result from works done at their request.

9. The taxes in the form of licenses are levied on certain persons or certain kinds of business for protection purposes for citizens.

Licenses

It is specially in the form of license that there are numerous taxes, but we must not forget that these licenses are imposed, not only to create revenue for the city, but generally they are asked for by the interested business men for their protection.

For instance, the tax imposed on dealers who sell in hotels, at first fixed at $100.00, has been increased to $300.00, and actually the retail merchants' association is asking that it be increased to $500.00.

The City, to conform itself to this demand, is obliged to go before the Legislature to obtain this power.

This fact reminds me of another question. How does it happen that the City of Montreal is obliged so often to go to Quebec?

The reason is very simple when we think of all the numerous questions that the administration of a great city, like Montreal, has to debate.

During the year, in consequence of the different problems submitted to the administration, the Law Department is consulted, and after studying the different laws which has created the City, comes to the conclusion that the City itself has no power to resolve these problems; then, the Law Department reports to the administration who asks the attorneys to make a record of the amendments to the City Charter.

From one question to another, new problems, application for new taxes, new systems request amendments to the City Charter which it is necessary to obtain from Quebec.

My lecture is over. I hope that this information will be of benefit to you in helping you to become more familiar with the administration of our great and important City of Montreal. I thank you for your attention.

The Efficiency of Labour

By H. MICHELL, M.A.
Professor of Political Economy, McMaster University

(Before Hamilton Chapter, Dec. 12, 1928)

WE live in what has often been called "a mechanical age," and the marvels of machine production on a large scale are all around us. We often hear that such and such a machine can do the works of 10 or 20 men, and perhaps have idly wondered what the effect of this displacement of labour by mechanical means may signify to mankind. We know that in the past, when machinery was first invented, a century and a half ago, the consequences were very serious, and have read how the poor displaced hand-weavers, bewildered at seeing their hard won skill go for nothing, rose and smashed the machines that were taking away their livelihood. To-day we are living in a new age of mechanical triumphs, and see before us a new "industrial revolution." It is worth while pausing a little and asking whether this amazing onrush of inventive skill is not going to affect our lives as deeply as it did the lives of our ancestors.

Progress on North American Continent

It is probably true that on the North American continent the use of ingenious machines for the alleviation of human labour has gone further than in other parts of the world. In the face of a great and prosperous homogeneous population, with a high average of intelligence and education, and with an exceptionally high standard of living for the masses necessitating a very high average wage rate, manufacturers in the United States and Canada have been forced to study the problem of mass production and, to a large extent, have solved it. The very real achievements of Mr. Ford in this field occur readily to the mind, and need not be enlarged upon. In the United States and Canada, we may find material for our reflections upon the probable results of the impact upon human labour of the machine. To state the problem exactly we have to ask ourselves the following questions:

First. Are any figures available which may give us a reasonably accurate estimate of the displacement of man power by machinery in industry as a whole, or in particular industries?

Second. Has this displacement of manual workers by automatic machinery been accompanied, as in the past, by an increase in total employment, sufficient to "take up the slack" in such industries chiefly affected by the installation of labour-saving machinery?

Third. What may we anticipate will be the ultimate effect of what we may call the new "industrial revolution?"

So far the actual statistical evidence is far from complete, but already indications are present that the displacement in several industries in the United States has been severe and far-reaching in its effects, and calculations made by competent observers in that country

provide material for reflection distinctly startling in its complications. We may, therefore, turn to some actual figures from the United States. Professor Paul H. Douglas, of the University of Chicago, writing in the Bulletin of the Illinois Department of Labour for March, 1928, has conveniently summarized the actual situation as follows: In 1925 the factories of the United States, according to the index of the Federal Reserve Board, produced 25 per cent. more in physical volume than in 1919, and in 1927, 26 per cent. In the motor car industry the increase was 72 per cent. in physical volume; in non-ferrous metals the increase was 62 per cent.; in the cement, brick and glass industries it was 100 per cent.; in petroleum refining 150 per cent., and in mining 38 per cent.

These figures, although striking, become amazing when the fact is realized that these increases were accomplished by considerably fewer workers. The Census of Manufacturers in 1919 showed the average number of wage earners employed was 9.0 millions; in 1925 the number was 8.4 millions, a reduction of 600,000 in 6 years. But since 1925 the pace has been accelerated, and in December, 1927, the United States Bureau of Labour Statistics showed a decline of 4.6 per cent. from the number employed in 1925. This indicates a reduction of about 380,000 more workers, or a total reduction since 1919 of 980,000, or about 11 per cent. of the total number employed in manufacturing. We arrive at the conclusion, therefore, that with 11 per cent. fewer workers than in 1919, the manufacturing industries of the United States produced in 1927 26 per cent. more in physical volume, or an increase per worker of 42 per cent.

Employment in Steam Railways

We may now turn to employment in steam railways, in which the figures are quite as striking as those in the manufacturing industries. In November, 1927, there were 185,000 fewer workers in the railways of the United States than in 1919. While figures for mining are not available in such exactitude, there is no doubt that the numbers employed were substantially reduced during the same period. Summing up this evidence, Professor Douglas comes to the following conclusion: "Taking these three major lines of employment, which in 1919 employed 11.8 million wage earners, or close to two-thirds of all industrial wage earners, the conclusion seems apparent that there were, at the very least, 1,200,000 fewer wage earners employed therein at the end of 1927. But the population of the country has been growing during this time at a rate which is probably close to 1.5 per cent. per year. If these industries had merely kept their proportional position, their working forces would then have normally been expected to increase over the period of eight years by about 12.0 per cent., or by between 1,400,000 and 1,500,000 workers."

It would not be difficult to go on multiplying instances where increased production has been obtained with fewer workers. To take but one more, this time from Canada. In 1919 in the flour milling industry 7,401 workers produced 17,842,833 barrels of flour. In 1926, 6,348 workers produced 19,056,162 barrels. That is to say, with a labour force in 1926 less by 1,052 than in 1919, over 1,200,000 more barrels of flour were produced.

Coal and Electricity

The reference to mining by Professor Douglas suggests some reflections as to increased efficiency in the utilization of coal in the generation of electrical energy. The coal industry is perennially distressed and universally in difficulties, much to the mystification of many, but one explanation has been generally overlooked, the increasing efficiency of the machines driven by steam generated by coal. For instance, the machinery used for the generation of electric energy has by the use of the turbine enormously increased the power generated with a corresponding decrease of coal used. Not so long ago three to four pounds of coal were needed in a power plant to raise one horsepower of energy for one hour. To-day, with generating units capable of delivering two hundred and forty thousand horsepower, from twelve to fourteen ounces of coal are sufficient to generate one horsepower hour of energy, and the ultimate limit of efficiency has by no means been reached. It is simply a matter of increasing the size of a turbine engine and its efficiency increases, while its coal consumption per unit generated decreases in inverse ratio. It is hardly to be wondered at that unemployment in the world's coalfields is chronic.

Amazing Facts in Agriculture

We may now turn to agriculture, and here we find some very amazing facts. According to W. M. Jardine, United States Minister of Agriculture, the farm population of that country decreased two millions between 1919 and 1924, and yet the volume of production in 1925 was one-seventh larger than in 1919, and the productivity of the average farm labourer increased 17 per cent. In 1850 each farm worker had the aid of one and a half mechanical horsepower. In 1925 he was using four and a half horsepower; and he is probably using more to-day. In 1880 each farm worker cultivated an average of less than twenty-two acres of crops. By 1900 he was cultivating about twenty-eight acres, and in 1925 about thirty acres. With a steadily and, of late years, a swiftly declining rural population, the production of foodstuffs has enormously increased. In the period 1922 to 1926, 20 per cent. more milk was produced from only 4 per cent. more cows than in the preceding five years. Production of meat and other animal products increased 9 per cent. more than food consumption.

Machine Production and Unemployment

What has happened to those workers who have been displaced in all the various industries? Of course, many have been taken into other branches of activity. Dr. Julius Klein, Director of the U.S. Bureau of Foreign and Domestic Currency, has some interesting comments to make on that point. "The higher wages of those workmen who have been retained in the factories and railways have stirred a nation-wide demand for automobiles, for radios, for telephones, for motion pictures, for cabarets, for restaurants, and for countless other contributions to comfort. These must not only be built, they must constantly be serviced. That is where the new business aspect of this problem comes in. More than 1,280,000 men have found employment since 1920 in driving and ministering to the automobile. This is an

impressive index of the amazing increase of our automobile vehicles, which have grown so rapidly that we have a car for every five persons in the country. Another striking indication of the same phenomenon, is the increase since the war of more than 100,000 in the employees for attending to, not manufacturing, electric refrigerators, oil heaters and similar household appliances, which so vividly typify the liberation of 'Mrs. Workman' from countless drudgeries."

There is no doubt that what Dr. Klein says is true. The swift onrush of productive activity in Canada and the United States has brought far greater purchasing power to the workman, provided that he has kept his job, or found a new one. Taking the 1913 figures as an index and calling it 100, wages in Canada in 1927 stood at 184, and the retail price level for food stood at 147 on the same basis. In other words, while the cost of living has advanced 47 per cent., wages have advanced 84 per cent. No wonder that the scale of living, even the scale of sheer luxury, has advanced so amazingly. It is not too much to say that at the present moment in Canada the artisan in regular employment enjoys a higher standard of living and of economic security than ever before in the history of the world.

The Other Side of the Picture

But there is another side of the picture, and that is summed up with sufficient brevity by saying that the United States has awakened to the somewhat disturbing fact that in the summer of 1928, at least four million workers were unemployed, and many have reckoned the number at considerably more. Of course, in a country of 110 millions that is not a very great proportion, but on any showing four millions are a lot of people, and all attempts at showing that this number is a "normal" proportion fail to carry very much conviction. Dr. Klein is undoubtedly correct when he says that great numbers who had lost their jobs in one industry found new ones in others, but that does not dispose of the one great outstanding fact that four million workers were unemployed. All that can be said is that if the new industries Dr. Klein talks so hopefully of had not absorbed those surplus workers, the number of unemployed would have been far greater than four millions.

The situation calls for serious thought, for it is a problem that confronts, not the United States alone, but sooner or later all industrialized countries. Are we seeing a new industrial revolution, which will bring in its train the same sufferings that its counterpart of the eighteenth century brought to the poor dispossessed hand workers? All "revolutions" are, by their very nature, the cause of profound disturbances; somebody gets hurt, and the magnitude of the change is the measure of the number who suffer from its effects. And, be it noted, this spectable of unemployment presents itself at a moment when the United States is enjoying a period of unexampled prosperity. What, we may reasonably wonder, will be the situation when the cycle turns once more and a period of slackness and depression comes? It is to be conjectured that the spectacle of unemployment will be impressive to a degree, and perhaps even alarming. All changes are painful, somebody gets hurt, and we cannot hope to make so great

a change as we see going on now without hurting a good many. That seems a callous saying. Can we not go forward without hurting anybody? Humanity has not, so far at least, found a way of doing so. This may be an unpalatable reflection for the humanitarian, but it is the truth, brutal though it may be.

The Ultimate Effect on Humanity

And now may we, greatly daring perhaps, approach our last and most difficult question of all, the ultimate effect of this "new industrial revolution" upon the human race—not the effect of to-day nor even to-morrow, but the effect on succeeding generations.

It is very difficult to speak with any confidence upon the future of the unemployment problem among manual labourers which this new development is causing. Is the world even now upon the threshold of a new and vaster development of productive industry that will make even our great populations of to-day but small handfuls in comparison with the vast multitudes of a few generations hence? It is hard to believe it. Somewhere that old bogey of economists, the law of diminishing returns, is lurking to cry a halt. Is it not more logical to think that we are seeing to-day an undoubted solution to the old problem of man's labour and his sustenance, whereby with the necessity for great armies of manual labourers a thing of the past, we shall see a stationary, or even a slowly diminishing population fed, clothed and warmed with an ever-increasing efficiency, thus at last giving to every man a chance to pursue that happiness, security and comfort which for so long has been a doubtful possibility at his birth, and for great numbers, too great for sober contemplation, an absolutely unknown and unattainable thing?

The explanation for the falling birth-rate is a vexed problem that has been keenly debated and has elicited many diverse opinions. One fact, however, stands out as undoubted, that the inducement to raise large families has largely if not wholly passed. Forty years ago a labouring man found it payed to have many children; at a comparatively early age they became wage earners and contributed to the family purse. To-day with the leaving age in school compulsorily raised, and with increasingly stringent laws against child labour, children have become a liability, and birth control conscious or unconscious, has reduced the size of families. Cheap labour of children is no longer readily available in large quantity as it was before the Factory Acts were passed, and employers have been forced to use higher paid labour and so have demanded greater efficiency from a smaller number of workers.

Conclusions to be Drawn

What conclusion may we then draw from these reflections with regard to the probable future population of the world? That is a difficult problem, and nothing is easier than to draw hasty conclusions from insufficient premises. It is probably that to future historians the nineteenth century will be chiefly remarkable for the amazing growth of population during that century, due to the opening up of the North American continent with its vast resources of foodstuffs. With increasing man-power came the ability to exploit the riches of nature, and

with the accumulation of wealth the opportunity to turn the inventive genius of mankind to the achievement of science. The industrial revolution enriched first the employers, and it was not until the close of the nineteenth century that the accumulated wealth began to percolate through all classes of society, and that strange phenomenon began which puzzled Adam Smith, and is still not entirely clear to us, a rapidly decreasing birth-rate. And this decrease of the birth-rate is by no means ended; it is gathering momentum in Europe, in every country in the world. With the swift perfection of mechanical devices we see that the vast armies of manual labourers, the mobs of hewers of wood and drawers of water, the navvies with pick and shovel who laboriously made their way over the earth, building great railways and bridging wide rivers, these are seeing their one-time supremacy pass. Where before a hundred men toiled and sweated at a task with no other aid than a few rude implements, the pick, the shovel, now two or three with gigantic machines at their command can do the same task better and quicker and with no more exertion than the management of the machinery demands. How many men toiled to raise the Pyramids, and how long did it take to build these gigantic monuments of man's toil? We do not know, but it would be interesting to have a modern contractor estimate the time and cost necessary to duplicate them; the companion would be an illuminating one.

And what may be surmised will be the ultimate effect of the machine upon the human race? Are we not still under the spell of Mrs. Browning's Cry of the Children, and think of machinery as deadening and soul-destroying? We hear of men in Mr. Ford's great motor factories whose whole life is given to tightening, endlessly and monotonously, one bolt, and we think of it as typical of a machine age that kills all imagination, all initiative, all that fine pride of work that inspires the master-craftsman. It must be confessed that to spend one's life tightening one bolt is hardly inspiring; but to find inspiration in one's work is, after all, not given to very many. It is not the monotony of the toil, and few labourers complain of such, that we need think of, but rather the shortness of the working day and week, the lifting from the shoulders of the workman the sheer weight of continued muscular effort of an exhausting, and ultimately killing, intensity. Adam Smith tells us that 150 years ago a carpenter in London was not supposed to last in his utmost vigor above eight years. The lengthening of the average expectation of life has generally been attributed to advances in medical science, and doubtless that has been a major factor. But we may wonder whether the supplanting by the machine of sheer muscular effort has not had almost as much to do with it.

We talk of the nobility of toil, and it is a fine and generous phrase, but we may well wonder if there is, after all, very much nobility in the back-breaking work of shovelling earth with a spade. An electric washing machine will save the aching back of some poor woman at that most exacting of all woman's toil, scrubbing clothes at a wash tub, and a vacuum cleaner will do in a few minutes what aching arms will only do in hours. Is it fancy only to think that to-day women are younger, less worn and harassed, prettier and more vivacious than their grandmothers, because the immemorial toil

of womankind has been lightened by the machine. The typical American or Canadian home, even of the poorer classes, is a marvel of neatness and cleanliness. Central heating, the furnace run by the man of the house with hardly more than a few minutes attention every day, has banished the weary work of attending grate fires. The electric or gas kitchen range is a marvel of efficiency, ease of operation and cleanliness. The electric iron, vacuum cleaner, washing machine, all do their work at a minimum of muscular exertion. With smaller families and the unceasing drudgery of household toil miraculously lightened, is it any wonder that women of the twentieth century are "emancipated?"

And so the tale may go on and on, and gradually out of the welter of all this seemingly hideous "mechanical" age emerges a new world, where man may at last find that the sheer drudgery of toil has been lightened a little, and he may live with some assurance of security, health and happiness.

THE TREND OF PRODUCTION COSTS

A FAIRLY general decline in commodity prices is attracting attention at the present time. Most of the important changes are in raw materials, which suggests that in a few weeks or months these will have worked through to finished products, possibly affecting the averages still further. The Dominion Government index number based on 502 commodities with 1926 as the base period, are as follows:

	May 1928	April 1929	May 1929
All commodities	96.4	94.1	92.4
Consumers' Goods	95.7	93.6	93.3
Producers' Goods	96.6	92.9	93.0
By classes:			
Vegetable products	93.0	84.3	81.7
Animals and their products	108.5	108.4	108.6
Fibres, textiles, etc.	94.3	92.4	91.8
Wood, paper, etc.	98.7	94.6	94.2
Iron and its products	93.2	93.5	94.1
Non-ferrous metals	89.9	98.7	95.2
Non-metallic minerals	92.5	91.9	92.0
Chemicals, etc.	95.3	94.9	95.4

The important advances in May were in the following: Dried fruits, live stock, meats and poultry; coke and inorganic chemicals. Substantial decreases occurred in the following: Domestic fruits, grains, flour and milled products, sugar, hides and skins, boots and shoes, milk and its products, raw cotton, raw milk, raw wool, brass, copper, lead, silver, zinc and plaster.

The financial situation has not changed materially, rates for both short term and long term money continuing high when compared with levels of the past couple of years.

Commercial Accounting and Costing

By E. COLLINS

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and

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A—Commercial Accounting and Costing

By E. COLLINS

I NOTICE that the description of this evening's address is "a lecture" and I suggest that this is not the correct name. I do not feel that I am qualified to give a lecture to each of you as I may have no knowledge of the particular problems in which you are ininterested individually, and I would therefore rather describe this as a talk based upon the application of accounting and costing to the commercial problems of our own business.

I consider that accounting and costing systems must be framed to meet the needs of the business and the most careful study is necessary to ascertain what these needs are. If the system arranged exceeds the needs then that excess is usually unproductive; if the system does not fit or falls short then its value is largely discounted. When deciding the system one should consider the nature of the business—in our case our sales include complete machines, a repair service and a local maintenance service. One should also consider the number of items to be accounted for—in our case it can be asumed that there are approximately 50,000 open accounts on our sales ledgers at any time. The average value of each item has also to be brought into consideration—in our case this is less than £10 per item. Having decided the needs of the business, design the system to accommodate them, having particular regard to:—

(1) Cost.

(2) Speed and accuracy.

(3) Simplicity.

(4) Accessibility.

(5) Flexibility.

The order in which I have stated these considerations is not necessarily their order of importance.

With regard to costing, I only propose to touch very briefly upon this subject as Mr. Sellars will address you in more detail. However, I regard it as a very important branch of the accountancy work and it is essential that it should link up with the financial accounts for the departments which require costing.

Commercial Accounting

My company act as distributors of their own products and their financial accounts are arranged in three main groups:—

1. **The Works Manufacturing Account** which is completely supported by the Works Departmental Cost Accounts. The Works Manufacturing Account is credited at what may be termed a works selling price or standard value for the whole of the works output.

2. **The Administrative Account.**—This account is debited with the cost of the works output at the standard values and also the expenses applicable to this section. The account is then credited with the charges to selling departments which are based upon list price less an arranged discount.

3. **The Accounts of the Selling Departments.**—These are debited with the goods purchased from the works at the price credited to the Administrative Account and are further charged with the whole of the expenses of that selling department, including the accountancy charges where the bookkeeping is a local responsibility. The selling accounts receive credit for the net selling price to customer.

We have a considerable number of selling departments. Our home selling is decentralised and for this purpose Great Britain and Ireland are divided up into 12 areas each controlling from its centre, which is known as the area office, the sales organisation of the area and the local repair and maintenance service afforded by the showrooms and repair branches throughout the area. There are considerably over 100 branches and showrooms throughout the country.

The accountancy work for our export business is dealt with by our head office staff but the goods supplied are distributed either through companies or branches or agents throughout the world.

The accountancy work of our home areas represents the major portion of the commercial bookkeeping for the company. At each area office there is located an area accountant, with the necessary staff, who deals with the whole of the clerical duties appertaining to the accountancy work of the area. This includes:—

Sales ledgers and correspondence.
Debt collection and correspondence.
The local banking of cash received.
Floating balances, viz. the supplies of cash for wages and petty disbursements on the impressed system for all branches throughout the area.
Payment of commissions.
Examination of orders for credit, referring to head office any substantial inquiries.
Supplying returns to head office for orders, sales, stock.
Analysis of wages paid, petty cash, local purchases, sales.
Costing of repairs and contracts.
Calculation of commission accounts.
Invoicing.

In addition to this the duties of each area accountant includes the submission of quarterly trading accounts and a yearly balance

sheet. The nominal ledgers of each area contain particulars of the relative assets and liabilities.

Having regard to the considerable number of separate trading accounts which are required for the different departments we have attempted to standardise the nomenclatures of dissections, that is to say, postage stamps are described as such in all the accounts and not as "Postage" in one, "Incidentals" in another and "Office Expenses" in another, so that the summarising of the accounts for the combined Profit and Loss Accounts is considerably facilitated.

Attention has also been given to the arrangement of these standardised dissections in a regular form and I should explain here that the number of our trading accounts lend themselves to collection in the nominal ledger in columnar form, trading debits being posted in black and trading credits in red and the totals arrived at or carried forward are net figures. So far as possible the dissections are arranged in the same order in the books of entry and in the nominal ledgers as they appear upon the standardised form of trading accounts. This facilitates posting and generally enables one to prove the accuracy of a series of postings by the cross total.

The volume of accountancy work has necessitated not only its systematic planning in detail but also that the supervision of the work of the different sections should be in itself carefully scrutinised. It has been found desirable to reduce the books of entry to what appears to be the minimum number. An attempt is made to allocate a fair load of work to each clerk according to his abilities and remuneration. The work of each clerk is progressed and the work of each section is similarly progressed by the institution of time tables which indicate when the different sections of the work for the usual accounting periods i.e. daily, weekly, monthly or quarterly, as the case may be, are required to be completed. The work in each section is also reviewed as frequently as possible in order to ascertain whether the work of the individual or the planning of the supervisor can be improved; in most cases I must admit I have found it to be the latter.

In coping with this large volume of work we have, of course, found it necessary to employ mechanical aids but here again I would emphasise the necessity for giving careful thought to the need for the equipment before effecting its introduction. We have accounting centres where ledger posting machines are economical; in our business I find that one electrically driven machine can cope with the posting of ledgers containing up to 4,000 open accounts. In some of our smaller areas the division of the ledger sections renders the use of such aids to accounting uneconomical. Adding and listing machines are also used by us where we find that it is essential to keep a record of the items which have to be added.

We also use a considerable number of calculating machines and having discovered by experience that 60 per cent. of the normal calculations of an accountant's department are in the nature of additions we use a machine of a well-known type which may be described as a general purpose machine and which is equally good for additions as for multiplications and other calculations.

Weighing and Counting Machines

The commercial accountant is finally responsible for the accuracy of the quantities paid for or invoiced against dispatches and there are practically no trades which do not require a weighing or counting machine from which to ascertain the weight and/or quantity to be paid for. Like all other mechanical aids to accounting the selection of a suitable weighing machine is important. If one uses an old-fashioned type of deadweight machine one can imagine an error being made by the weigh-man in calculating the total of the different weights he has placed in the weights pan and the possibility of error is again increased by the chance of the weight being transposed or otherwise mis-stated when written down. A much better type of machine is one which automatically indicates the exact weight thereby considerably reducing the chances of an error being made in recording the weight in the books. In the heavier types of machines such as weighbridges there are those which are supplied with a printing attachment. Having regard to the relative speeds and the possibilities of error it should be easy for you gentlemen to advise on the subject of this equipment.

In the calculation of wages which may be based on a system of remuneration by results and in stock-takings, it has been found that counting by weighing is the quickest method of arriving at quantities. For these and other costing purposes we have found that counting machines can be used with considerable advantage.

The principle of counting by weighing is first of all the ascertainment of the weight of the total, next the ascertainment of the weight of a specified quantity of the same articles and by reference to the charts with which the machines are equipped the total number contained in the first weighing is immediately ascertained. The advantage of this method of counting can easily be judged if one considers operations or stocks numbering 5,000 or 10,000 of each article where the variation in the individual weight is known to be infinitesimal and where it is important that the total number shall be calculated quickly. I am quite serious in my strong recommendation of this method: I am not trying to sell you weighing machines but should our technical departments ever design a satisfactory ledger balancing machine I shall most certainly endeavour to dispose of it to you.

In the course of our experience we have invented or learned through outside sources various short cuts and economical methods which appear to be quite satisfactory in our case, e.g. a very large number of our repair and contract charge are individually for amounts which are less than £1 and we have therefore used a specially worded adhesive slip which is attached to all invoices for less than £1 which indicates that it is not proposed to send a statement for the item in question and that payment is asked for on the terms of the invoice. This has been most successful and I am glad to say that during the last three years we have applied this to over a quarter of a million invoices. Each slip represents a saving of an envelope, a ½d. stamp and the stationery and clerical work which would otherwise be required in the rendering of the statement.

We find that window envelopes save retyping addresses but we find it necessary to so design our statement and invoice forms that with a minimum number of folds we obtain maximum visibility of the name and address when in the envelope and leave very little room for any dispacement of the document in post.

We give special attention to the invoicing of our maintenance contract charges which are generally due every quarter. These number rather less than 70,000 representing approximately a quarter of a million invoices per annum. We do not make ledger copies of these invoices but have the customers' copies so printed and arranged that the four quarters invoices are typed at one operation. A columnar day book is used in conjunction with these contract invoices. Twelve columns are provided, the contract number, name and address being shown on the lefthand side and the premium is entered quarter by quarter on the same line under the respective columns as the charge becomes due. This day book is so arranged as to give totals in the dissection form required.

With certain types of our scales which are in general use throughout the country we supply a considerable proportion on hire purchase terms. The average selling price of these machines is about £30 and assuming the hire purchase terms to extend over 15 months one can visualize the trouble which would be caused to the customer in the payment of these 15 separate instalments. I therefore instituted a form of banker's order which is worded somewhat to this effect:—

> To (and here is filled in the name and address of the customer's own bank) please pay to the order of Messrs. W. & T. Avery Ltd. (followed by the name and address of our bank) the sums specified hereunder on the dates mentioned.

Below this there are stated the dates and amounts payable with a total of same to indicate the limitations of payments and the form is signed by the customer over a twopenny stamp. When this is done and provided the requirements of the order are met by the customer's bank the customer has nothing further to do and in the instance quoted would be saved the trouble and expense of remitting fifteen separate cheques and paying postage and writing the covering letters for same. We have a large number of these in operation and have received many expressions of appreciation from customers who have availed themselves of this method of payment.

With regard to debt collection, the number of our outstanding accounts will indicate that this is a very important problem to us. We find that we cannot deal with all customers by using the same kind of stereotyped application and we have therefore classified the customers roughly on the following lines:—

(1) Large concerns.

(2) Small concerns but prompt payers.

(3) Slow payers who have, in the past, required several applications before making settlement.

(4) Those who only pay when they are threatened with a summons or against judgment.

I am afraid that my address has been rather disconnected and that everything mentioned has not been placed in its order of importance or its relative sequence but I have endeavoured to give you a collection of hints gathered from my own experience which I hope will be of assistance to you in your professional capacity as advisers to commercial concerns. I thank you for the attention you have accorded me and if you derive any benefit from this address I shall feel amply rewarded for my efforts.

B—Commercial Accounting and Costing

By F. B. SELLARS, F.C.W.A.

In delivering this short resume of our practice and opinions of cost accounting we do not wish you to assume we have reached finality. Our practice of to-day is based largely upon the results of past trials and errors, and most probably in another twelve months' time we shall have to revise many of our present views in the light of further experience.

This evolution is necessary since any system must be governed in part by the methods of works manufacture and as these methods are revised and improved so much our accounting be revised also to meet new conditions. It is this very revision of manufacturing methods that has been the direct cause of the growth of cost accounting.

Prior to the last 40 years this branch of accounting was unknown as it was unnecessary. The large and highly complicated factories engaged in mass production were yet to come and the then "small" manufacturer depended upon his own close knowledge of his product and of his shops to guide him in his policy of manufacture and distribution.

On Wednesday last we had the pleasure of entertaining you at our Soho works. You then had the opportunity of seeing to what extent this change has occurred. The craftsman who frequently made an article throughout has been replaced by complicated machinery designed to perform certain special operations only on particular components. In other words, the processes of manufacture have been divided and sub-divided to obtain speed of production and standardisation of product.

In the production of our scales and testing machines almost every variety of machine tool is employed. We have floor and machine moulding, light and heavy stamping, light and heavy pressing, die casting, capstan lathes, heavy lathes, spray painting equipment, furnaces for hardening, and for the burning of porcelain enamelling, and stoves for hardening paint on our products. All these are very interesting and very necessary in order to obtain the highest possible standardisation of quality and of components at an economical price, but all of these present diverse problems to the cost accountant.

Dealing with our manufacturers we produce every class of scale from the diamond balance which can be comfortably carried in the pocket, to weighbridges capable of taking a load of 100 tons. In addition we produce automatic weighing machines and testing machines

up to the largest in the world (I refer here to the 1,250 tons Universal Testing Machine designed to test the girders as used in the building of the Sydney Bridge—this machine of course, was something of an event in our production).

Naturally so varied a production requires a vast number of particular manufactured parts to be stored in lockers, and you may be surprised to learn that we regularly have in constant use, approximately 50,000 lockers each bearing a different component, or a component in a different stage of manufacture. From this it will be seen that no one detailed system of costing can be regularly employed to cover all conditions, so that the detailed arrangements of any system introduced must be varied according to the manufacturing practice in the shops. I have not told you this in order to confuse you or in order to exaggerate the difficulties which are met with; they are common to any large engineering firm manufacturing a diversity of products, but I have explained this in order for you to appreciate the various factors which have to be taken into consideration when designing a scheme of cost accounting.

Although methods of shop routine may not be standardised we are far more happy in the principles of cost accounting. In the methods we employ we consider the following points as absolutely essential:—

(1) That the system employed must be an off-shoot and a complete support to the commercial accounting. If it fails in this respect it fails altogether since the results shown by the cost system may give information not subsequently supported by the financial accounts.

(2) That any results obtained must be of immediate or ultimate use either to the accountant or to the works management. In other words, all the information must be directly useful. Anything in the nature of useless repetitive detail should be rigorously cut out.

That brings me to a point that is frequently considered the point of margin of error.

Assuming that certain statistics are required there is always more than one method of obtaining the information and usually one method is more accurate than another. Usually also, one method is more economical than another. In solving the question as to which method to apply, we carefully examine to what extent the more economical method can be inaccurate, and having in mind the use to which the information will ultimately be put, we accept the margin of error if at its worst the figures so obtained are not misleading. This point may seem obvious, but it is surprising to what extent one can laboriously insist upon accuracy when fine limits are not essential.

A little story very well illustrates the point.

With tears in his eyes a kiddy approached a local farmer and complained bitterly that they had no vegetables for their

dinner. Good-naturedly the farmer told him to go into the field and pull a turnip as big as his head. Five minutes later the farmer was confronted by his labourer demanding to know what permission had been given to the kiddy. "Oh it's all right, John," said the farmer, "I told him to pull up a turnip as big as his head." "Ah," said the labourer, "D'ye know he's pulling 'em all up and trying his hat on 'em."—And that's that.

(3) That cost and statistic results useful to the management are produced at the earliest possible moment to ensure their being useful.

Cost accounting is more and more proving its value in future budgetting rather than in recording past results. Even in this branch of the work these past results are only useful so far as they guide the management for the future.

(4) That we consider it essential that any system introduced must not interfere unduly with production, and we take the advice of works officials when there is doubt.

In practice forms carrying costing information can frequently be made to aid the works particularly on progressing. Where it is to the advantage of foremen and departmental clerks to use such information, there is a more definite guarantee of accuracy.

If the system introduced be too intricate or difficult to explain, foremen and works' clerks will lose interest in the scheme and results will be unsatisfactory.

(5) That any cost accounts produced should be in the same standard form and should use the same standard nomenclature of dissections as the financial trading accounts to which they are supplementary.

So much for our problems and our principles. Now for their application.

A large proportion of our manufacture is a continuous repetitive production, and the minority is special large machines. To cover the whole we use a system of departmental and if necessary, operation costing, and to cover what may be termed jobbing lines, we use job costing but only as a subsection of account costing. This is logical when we consider that cost accounting is to a large extent the means of allocating profit or loss, either to definite lines of manufacture, departments, or to definite jobs.

When dealing with continuous production we are more concerned with departments.

When dealing with special lines we deal with individual jobs.

For various manufacturing reasons, including the inter-changeability of parts, it has not been found advisable to cost lines of manufacture continuously, and since where possible it is always advisable to tie down results to individuals, we divide our factory into departments each of which is definitely under the control of the departmental manager.

Mr. Collins has explained to you how for accounting purposes, the country is divided into areas, and the areas into branches. Carrying on his practice of standardisation of methods and of account, we likewise divide the works into departments, and where necessary into sections or operations, and just as the branch and areas accounts are designed on standard lines with the trading account, of which they are part, so our departmental and sectional accounts are standardised in form and nomenclature. Comparison is thus rendered easy and accumulation in books of entry and of accounts is simplified.

The mention of an account implies a debit and a credit. Dealing with the credit to the works first, we have a basis which, curiously enough, is not entirely based upon cost.

When considering inquiries for selling price, a decision is made as to whether an approximate price is required, correct say to 5 per cent., or whether a most detailed accurate estimate is necessary. The production of a new line would fall into the second category. Technical department would confer with works, works with foremen and ratefixers, and all departments with the cost office, and ratefixers and technical departments would produce for every component, drawings backed by a part list and estimated times for every operation on every component. From cost office records based on past experience these would be priced and two estimated costs forwarded to the selling side. One shows the cost in material, labour and charges arrived at on the assumption that every department of the factory is working at full load and full normal efficiency. This is known as a "normal estimated cost." The second price which is higher, is based on material at market prices, labour at the usual labour rates and charges arrived at from the results of the last accounts produced, but varied by an intelligent anticipation of their possible alteration between the time of their production and the time of the estimate. This is known as "actual cost." The selling price is then fixed taking into consideration cost and other economic factors. The Cr. to the works is then fixed as an economic value that can be allowed after considering selling expenses, profit, &c. By this means the works are compelled to assist the selling side in their efforts to obtain business.

If the Cr. to the works which is known as "standard value" is less than the "actual cost," the machine and all its parts are reported to the general works superintendent who, in consultation with technical and production departments mainutely investigate the figures and makes reductions where necessary without alteration to quality. This standard value is used as the Cr. to the works in the financial accounts and since the finished output of the works is the total of the outputs of the various finishing departments, the same figures are allowed to the finishing departments as their credit.

I have said before that the use of cost accounts is to allocate deficits against a standard. For finishing departments therefore we have a standard value, but there are difficulties in splitting up a standard value allowed for a machine in proportion to the normal cost and since the normal cost is based upon figures of efficiency which are capable of being reached, and which at times have been reached, for both

finishing departments and other departments, Cr. is also allowed on the normal estimated cost as obtained from the estimate sheets. It follows therefore that should any department's expenses be greater than their output costed at normal value, a deficit will occur which should be the basis of an investigation. For the finishing departments alone there are two credits, one based on the output costed at standard value and the other on the output costed at normal estimated cost.

I will explain later that all departments are treated as separate factories and all deliveries of components, materials, parts, &c. are charged to the department at normal cost.

The difference between the Cr. at normal value and the output costed at standard value indicates the extent of surplus we can anticipate on the financial works trading account assuming that the works are working at full efficiency. This figure does not appear in our financial accounts.

Our maintenance departments are treated in the same way except that instead of using a percentage of the selling price as a Cr. to the department, Cr. is apportioned under two headings:—

(1) For special jobs—an accurate estimate.

(2) For routine maintenance—the figures contained in a budgeted maintenance contract agreement with a definite sum allocated under dissections for the total maintenance of the works.

Even our maintenance departments therefore are treated as separate factories and any prices submitted for maintenance work are, as a rule, compared with outside quotations before acceptance. You will see therefore that our maintenance expenditure is budgeted for and actual expenditure compared against it.

When making up our estimates for maintenance work and our cost also, assessed common charges are included. From a trading point of view, this is, of course, a fictitious entry and it is corrected by a separate Cr. in the "varying charges" portion of our trading account. So much for credits.

Dealing with debits, each department or section of a department is debited with its actual consumption in material, labour and charges.

For purchases we follow the practice of indirect dissection. In other words, all purchases are debited to departmental stores accounts, this with the exception of large specific items where direct dissection is practised.

All material issued in debited to the receiving department. To simplify explanation we will divide our departments under four headings:—

(1) Maintenance departments.

(2) Initial departments, i.e., departments which work solely from material purchased outside.

(3) Feeder departments which take the finished product of the initial department.

(4) Finishing departments which are chiefly engaged on assembly.

The outputs of the maintenance and initial departments are credited at contract or normal cost, the debits being:—

(a) For maintenance departments to the repairs dissection of the receiving departments common charges.

(b) For initial departments to the departmental raw material section of the receiving department.

A point here should be noted that an initial department's sales is a feeder department's purchases and, mark this, one is equal to the other. Similarly, the feeder department's sales is the finishing department's purchases, and again they cancel out. The debits to the finishing departments are accumulated on the "snowball" principle for each component as it is processed through the factory, and the normal estimated cost is used throughout. Consequently the inefficiency of any one department is not transmitted to the following department. This is important.

Dealing with the accounts themselves, I do not propose to go into great details as I assume that you have a close knowledge of this branch of accounting.

Our accounts are standardised in form and are governed by the financial control accounts. A moment's thought will show that this is simple since commencing stocks of raw material purchased from outside are the sum of the commencing stocks of raw material under each individual department. Purchases of raw material from outside appearing in the works trading account are equal to the sum of purchased raw material from outside shown for each department. Consequently consumptions of raw material received from outside shown by the trading account are equal to the sum of consumptions in each department.

A deviation occurs under the heading of departmental raw material. Departmental raw material is material which is raw material to the department which has to process it further, but is a finished product for some previous department. So far as the financial accounts are concerned therefore, this is part-finished stock. Also departmental finished material appearing in any department other than a finishing department is for financial purposes, part-finished stock.

Dealing with a department's sales, the outputs of all departments other than finishing departments are the departmental purchases of other feeder or finishing departments, and for financial purposes they therefore cancel out, so that the results of those interdepartmental transactions are merely a variation of place of work in progress.

Dealing with productive labour and common charges applicable to each department, using the standard account form and standard nomenclature, the details of each dissection under individual departments are equal to the amount shown against this dissection in the financial accounts, this with the exception of known differences due to questions of policy. An example of this is when a different rate of depreciation is being used for costing purposes than is being used for purposes of finance.

It will be seen therefore, that there is no great difficulty in applying this system of accounting to allocate losses to every section of our complicated factory, and by its results to isolate departments making losses rapidly.

In departments handling large individual jobs and for maintenance work, job costing is practised in order to obtain further supplementary information.

The allocation of material or labour presents few difficulties but I anticipate you will be more interested in the allocation of overhead expense.

Still retaining the same headings of the trading account, we divide all expenses under the following headings:—

(1) Expenses which can be allocated directly to a machine or bank of similar machines. This covers repairs, belts, power, machine toolsetting and (based on area) rental, light, heating, &c.

(2) Expenses which can be allocated to a department but which it is not economical to divide over individual machines. These are repairs to buildings, fixtures and fittings, departmental salaries of foremen, progress clerks.

(3) Expenses which can be debited to works but which cannot be definitely allocated to departments on anything but an arbitrary basis. These are works staff and proportions of clerical services, certain portions of experimental work, laboratory, buying department.

(4) Expenses which can be directly allocated to departments such as technical staff handling specific classes of work.

Departmental expenses and technical expenses are allocated over machines on a basis which is the mean of their actual running in a period, and the hours that they would have run under best conditions. Works expenses, administration, &c., are split up over departments again on the mean of their full output and their actual output over a period.

For the allocation of common charges we use two machine class hour rates.

(1) Normal hour rate based on the cost per hour run of the machines assuming full production.

(2) Actual hour rate based on the expenses of the machines as previously detailed, divided by the actual hours run in the period.

To obtain repetitive check figures for the normal charges rate, the results making up the actual charges rate are taken and then such expenses as would be increased by a heavier load are increased in proportion to the number of hours, but varied by factors applicable to each class of operation. The new total is then divided by the full normal hours.

The actual charge per hour is revised in accordance with account results and both are checked should the account results indicate the necessity.

This concludes our method of account production. It will be obvious that there is a need for quicker methods for the direct location of losses in material and labour.

We believe in direct application in this case.

For Labour.—A copy of the estimate for each operation for each component is passed to our wages section who check all times allowed against these rates weekly and report discrepancies.

For Material.—From the estimate quantities of material are evolved and passed to the storekeepers, as their authority for the issue of material. Any excess material is specially requisitioned and reported. We do not cost all issues from stores but arrive at this departmental issue by the fluctuation in stock as disclosed by our stocktaking, plus the purchases of each department.

We also have a very close stock card record of all material and as a running check on the accuracy of these cards, when any material is purchased the actual stock in the locker is written to the card against the balance shown thereon and discrepancies are investigated.

Rejected work.—Any work rejected is reported in duplicate, one copy of which is for cost information, who credit the department with the full value of the article as if it were good, and debit the department at fault with the difference in value between the good and scrapped component. This appears as a special dissection of the overhead in each department and the totals are regularly reported to the works superintendent.

Stocktaking.—Stocktaking takes place each quarter and we are pleased to say that in spite of having to take 50,000 lockers in addition to work in progress, we do so with a total stoppage to the works of four hours. This seems somewhat startling, and obviously some complete preparation is necessary. Our methods are as follow: Using or stock locker scheme for three weeks prior to stocktaking, we have cost office operators in each department of the works. These operators check haphazard each day a number of lockers and actually have the contents counted and weighed. We reckon on a 10 per cent. check, in other words, 5,000 lockers.

Discrepancies between actual and recorded stocks are reported departmentally, and if there are serious stock discrepancies the whole of the section is taken. In actual fact this course has not been necessary during the last five years.

I want to avoid salesmanship, but I must emphasise that we could not get through this work without the use of counting and weighing machines. Undobtedly the quickest way of counting is to weigh and we use to a large extent, our counting machines and platform weighing machines. With the first named one article placed on one pan is equal to a gross placed in the other. In practice the whole of the components in the locker are placed either at once or in several weighings into the pan with the exception of a few left for manipulation. These are placed in the weight pan and when the beam balances the total quantity on the loading side of the

scale is equal to the number of articles on the weight side multiplied by 144. One, of course, then adds the number in the weight pan.

For larger articles we use our platform weighing machines and we are now extending the use of scales even to rejected material, particularly in aluminium and zinc die castings, and brass castings, to discover faults due to blow holes prior to machining. This result is obtained by comparing the specific gravity of the article to be tested with a known standard. The same principle is adopted to replace chemical analysis as to the mixtures employed.

After making this routine check we then assume that the balance shown on the cards is correct, after taking into consideration all receipts and issues up to the time of stocktaking.

For work in progress we anticipate all writing by issuing a work-in-progress card for every order outstanding. It only remains then for the articles to be actually counted and allocated under the last operation done.

We again obviate repetitive writing in accumulating the totals of locker stock by using a columnar book. It bears the locker number and a description of the component on the one side, and space for every quarter up to three years. In each space provision is made for quantities to be inserted from the locker cards and prices in terms of units, each unit of which is a known value. When entered from the cards these books are passed to a bank of comptometers who have their material in the best possible form for rapid extension and accumulation.

By this means we produce finished dissected statements of stock in 14 days.

I think you will judge from what has been said that we attempt to live up to the principle outlined to you. I will now add a last one. We find in practice that speedier and more useful information is obtained by producing comparatively broad results, i.e. departmental results, and then making an intense investigation into discrepancies rather than in attempting repetitive detail costing. In addition, by an intelligent use of the margin of error, we quickly obtain resuls at an economic outlay.

PERSONAL MENTION

President R. R. Thompson is enjoying a holiday at Cedar Cliffs, Georgeville, Nr. Magog, Quebec. He will be leaving in July for a trip through the Canadian west, in the course of which he will address a meeting of our Winnipeg Chapter, and possibly also further meetings at other points.

Percy C. Darrell, formerly with P. S. Ross & Sons, Montreal, is now with the Rex Oil Company in that city.

L. P. Bernier, of Montreal, has changed his address from 4116 St. Hubert St. to 4083 St. Hubert St.

Hugh F. Kerrin, C.P.A., C.G.A., Montreal, of Edward C. Baker, Kerrin & Company, has changed his address to 832 St. James St.

Oscar H. Menzel, a new member of this Society, Hamilton, has moved from Dominion Foundries and Steel, Ltd., to Eclipse Oils, Ltd.

E. D. C. Thomson, C.A., of Geo. A. Touche & Company, Edmonton, has moved his office from the Tegler Bldg. to Canadian Bank of Commerce Building.

W. J. Mundell, of Ogilvie Flour Mills Co., Ltd., and Chairman of Winnipeg Chapter this year, was recently elected president of the Employers' Association of Manitoba.

POSITIONS DESIRED

No. 274—Position wanted in cost or similar work. Age 34 years, married, good college education, course in advanced accounting at McGill, 15 years business experience, bilingual. Good references. Accounting experience includes 12 years commercial and industrial, costs, statements, budgets, etc.

Number 275—Office Executive, accountant, desires position in Toronto. Would take entire charge of staff, handle costs, production, or any responsible position in keeping with a long and excellent experience. Good references.

N. A. C. A. CONVENTION

The annual convention of the National Association of Cost Accountants, which was held at West Baden Springs, Indiana, June 17-20, marked the 10th anniversary of the founding of the organization. The technical sessions included discussions of the following subjects: Setting up an Organization; Setting up the Records to Fit the Manufacturing Organization; Setting up the Records to Fit the Sales and General Organization; Setting the Standards; Incentives-Executive and Key-Men; Administering the Business for Profit.

The program was rounded out by a plant visit, president's reception, banquet, exhibits, golf and other entertainment.

COST LITERATURE

OPERATING COST STANDARDS. By Charles J. Robinson, Society of Industrial Engineers Bulletin, April, 1929.

Better Management. By Col. Edward T. Miller, Chicago. Society of Industrial Engineers' Bulletin, April, 1929.

Setting Burden Rates in Accordance With What Traffic Will Bear. By Harry A. Bullis, secretary and controller, General Mills, Inc., Minneapolis. The American Accountant, June, 1929.

Some Factors Which Prevent Cost Systems from Working Properly. By A. W. Bass, Westinghouse Electric & Manufacturing Co., East Pittsburgh, Pa. The American Accountant, June, 1929.

Maintaining a Minimum Inventory in Co-ordination with Sales Budget. By Edmond S. LaRose, assistant controller, Bausch & Lomb Optical Company. The American Accountant, June, 1929.

Real Accountant a Prophet, Not Merely Historian, of Business. By John V. Montague, Waterbury, Conn. The American Accountant, June, 1929.

Quarry Costing. By R. Rees Williams, A.C.I.S. The Cost Accountant, May, 1929.

Industrial Organization. By Kennth M. Sloan. The Accountants' Magazine, May, 1929.

Why a Clean Factory Means a Better Product. By Joseph W. Foster. Management, April, 1929.

RATIOS FOR PRINTING MANAGEMENT

THE United Typothetae of America, Inc., Department of Finance and Accounting, has printed in booklet form its Ratios for Printing Management, as developed from members' annual balance sheets and operating statements. Since 1913 Typothetae has compiled each year the average hour costs of the printing industry. The latest figures cover 1927 reports, obtained from twenty-eight states and three Canadian provinces.

The following reference is made generally to "Financial Ratios as Measures of Management":—

"One of the most significant developments in modern business is the growth of uniform accounting and costing. Intensive investigation by trade associations of the individual problems of members and of their industry has resulted in uniform systems of accounting and costing for the industry. The standard cost and accounting systems of the United Typothetae of America, built up from actual experience of the leaders in the printing industry and developed over a period of seventeen years, constitute a wonderful machine for gathering basic facts concerning the financial and operating aspects of the printing business. These systems provide specific plans for developing cost rates and for current and periodic analyses of a business. This uniformity in both costing and accounting provides the common basis upon which each individual business may make intelligent comparison of its own results with the average for the industry."